UNITED STATES PATENT AND TRADEMARK OFFICE

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

	Application No.	Applicant(s)
Office Action Summary	10/797,635	RIDGE ET AL.
	Examiner	Art Unit	
	CHRISTOPHER FINDLEY	2621	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE _3_ MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1) ☒ Responsive to communication(s) filed on _02 June 2008_.
2a) ☐ This action is **FINAL**.   2b) ☒ This action is non-final.
3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4) ☒ Claim(s) _3-17,20-23,25 and 27-31_ is/are pending in the application.
    4a) Of the above claim(s) _____ is/are withdrawn from consideration.
5) ☐ Claim(s) _____ is/are allowed.
6) ☒ Claim(s) _3-17,20-23,25 and 27-31_ is/are rejected.
7) ☐ Claim(s) _____ is/are objected to.
8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9) ☐ The specification is objected to by the Examiner.
10) ☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.
    Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
    Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
    a)☐ All   b)☐ Some * c)☐ None of:
        1. ☐ Certified copies of the priority documents have been received.
        2. ☐ Certified copies of the priority documents have been received in Application No. _____.
        3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
    * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)
1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Response to Arguments

1.   Applicant's arguments, see pages 8-11, filed 6/02/2008, with respect to the
rejection(s) of claim(s) 3-7, 9-17, 20-23, 25, and 27-31 under Koto et al. (US
20030215014) in view of Kato et al. (US 6151360 A) and claim(s) 8 under Koto et al.
(US 20030215014) in view of Kato et al. (US 6151360 A), and further in view of Wu et
al. (US 6700933 B1) have been fully considered and are persuasive. Therefore, the
rejection has been withdrawn. However, upon further consideration, a new ground(s) of
rejection is made under Koto et al. (US 20030215014) in view of Kim et al. (US
20030123539 A1) (claims 3-7, 9-17, 20-23, 25, and 27-30) and under Koto et al. (US
20030215014) in view of Kim et al. (US 20030123539 A1), and further in view of Wu et
al. (US 6700933 B1) (claim 8).

Claim Rejections - 35 USC § 103

2.   The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all
obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set
> forth in section 102 of this title, if the differences between the subject matter sought to be patented and
> the prior art are such that the subject matter as a whole would have been obvious at the time the
> invention was made to a person having ordinary skill in the art to which said subject matter pertains.
> Patentability shall not be negatived by the manner in which the invention was made.

3.   **Claims 3-7, 9-17, 20-23, 25, and 27-30 are rejected under 35 U.S.C. 103(a) as
being unpatentable over Koto et al. (US 20030215014) in view of Kim et al. (US
20030123539 A1).**

Re **claim 4**, Koto discloses a method, comprising: selecting M reference frames
for a given original video frame from a video sequence having a plurality of video
frames, each frame containing a plurality of coefficients, wherein M is a positive integer
equal to or greater than 1 (Koto: Fig. 11); partitioning said original video frame into
rectangular blocks of coefficients (Koto: Abstract section); and from each of the M
reference frames: forming at least one reference block of coefficients from an offset of
the rectangular blocks (Koto: Fig. 12, the frames are partitioned into blocks and motion
vectors indicate offsets); and obtaining a block difference at least partially based on a
summation of differences between individual coefficients in each of said rectangular
blocks of coefficients and corresponding individual coefficients in said at least one
reference block of coefficients (Koto: Fig. 33); and optimizing the offset at least partially
based on the block difference (Koto: paragraph [0146]). Koto does not specifically
disclose using the absolute values of the differences between corresponding individual
coefficients in each of said rectangular blocks of coefficients and said at least one
reference block of coefficients. However, Kim discloses a method and apparatus for
video bit-rate control, wherein motion vectors are computed by a sum-of-absolute-
difference (SAD) based block matching scheme (Kim: paragraph [0017]) and the SAD
calculation compares current and reconstructed previous luminance samples on a pixel-
by-pixel basis (Kim: Equation [2]; paragraphs [0018]-[0022]). Since both Koto and Kim

relate to the coding of video sequences with predictive motion information, one of

ordinary skill in the art at the time of the invention would have found it obvious to

combine the SAD calculation of Kim with the coding scheme of Koto in order to provide

a system capable of adaptive quantization, thus allowing the system to operate at a

reduced computational complexity while still maintaining a target bit budget (Kim:

paragraph [0024]). The combined system of Koto and Kim has all of the features of

claim 4.

Re **claim 3**, the combined system of Koto and Kim discloses a majority of the

features of claim 3, as discussed above in claim 4. Additionally, Koto discloses that for

each of said rectangular blocks of coefficients and each permutation of a horizontal

offset value X and a vertical offset value Y, obtaining M additional rectangular blocks of

coefficients for providing M reference blocks, wherein each of said M reference blocks

of coefficients is formed by selecting coefficients from the M reference frames, such that

the coefficients in the M reference blocks of coefficients are horizontally offset by

distance X and vertically offset by distance Y from a corresponding coefficient in said

rectangular block of coefficients (Koto: paragraph [0146], candidate motion vectors are

scaled according to inter-frame distance, leaving only a 2-dimensional (x, y) offset).

Re **claim 5**, the combined system of Koto and Kim discloses a majority of the

features of claim 5, as discussed above in claim 4. Additionally, Koto discloses for each

of said rectangular blocks of coefficients, determining an optimal horizontal offset X and

vertical offset Y, wherein said determining is based at least partially on minimizing a

weighted sum of M block differences (Koto: paragraph [0013]).

Re **claim 6**, the combined system of Koto and Kim discloses a majority of the features of claim 6, as discussed above in claim 4. Additionally, Koto discloses that each of the M video frames selected as the M reference frames is computed based on the same frame of original video (Koto: Fig. 12).

Re **claim 7**, the combined system of Koto and Kim discloses a majority of the features of claim 7, as discussed above in claim 4. Additionally, Koto discloses that the block differences for the M reference blocks are combined for providing a weighted sum having a plurality of weighting factors, and wherein each weighting factor in the weighted sum is determined at least partially based upon a quantizer parameter or the index of the reference frame subjected to that weight (Koto: paragraphs [0081]-[0084]).

Re **claim 9**, the combined system of Koto and Kim discloses a majority of the features of claim 9 as discussed above in claim 5. Koto does not explicitly disclose that motion is represented by a motion vector to be encoded in bits, and wherein said determining is also based on the number of bits needed to encode the motion vector. However, Kim discloses a method and apparatus for video bit-rate control, wherein motion vectors are selected based on the displacement of the search point that results in a minimum SAD among the SAD values in the search space, and the information provided by the SAD may be utilized for bit-rate control (Kim: paragraph [0023]). Since both Koto and Kim relate to the coding of video sequences with predictive motion information, one of ordinary skill in the art at the time of the invention would have found it obvious to combine the SAD calculation of Kim with the coding scheme of Koto in order to provide a system capable of adaptive quantization, thus allowing the system to

operate at a reduced computational complexity while still maintaining a target bit budget

(Kim: paragraph [0024]). The combined system of Koto and Kim has all of the features

of claim 9.

Re **claim 10**, the combined system of Koto and Kim discloses a majority of the

features of claim 10, as discussed above in claim 5. Additionally, Koto discloses that

the set of M reference frames is divided into N sub-sets, such that each of the M

reference frames belongs to precisely one of the N sub-sets, and wherein the process

of determining the optimal horizontal offset X and vertical offset Y is repeated for each

of said N sub-sets of reference frames, for indicating a set of N optimal horizontal

offsets X and N vertical offsets Y (Koto: Fig. 11, MPEG may use a linear prediction

scheme, allowing a group of pictures (GOP) may be divided into subgroups).

Re **claim 11**, the combined system of Koto and Kim discloses a majority of the

features of claim 10, as discussed above in claim 5. Additionally, Koto discloses that

said determining of the optimal horizontal offset X and optimal vertical offset Y involves

a discrimination against offsets with large magnitudes (Koto: paragraph [0146], the

minimum value is sought).

Re **claim 12**, the combined system of Koto and Kim discloses a majority of the

features of claim 12, as discussed above in claim 11. Additionally, Koto discloses that

the discrimination is at least partially dependent upon an index corresponding to which

of the M reference frames is being considered (Koto: paragraph [0146], candidate

motion vectors are scaled according to inter-frame distance).

Re **claim 13**, the combined system of Koto and Kim discloses a majority of the features of claim 13, as discussed above in claim 10. Additionally, Koto discloses that the number N may vary from one frame of video to another frame of video (Koto: Fig. 11, the number of reference frames may vary as well as the number and type of frames in a GOP, allowing the number of subsets to vary accordingly).

Re **claim 14**, the combined system of Koto and Kim discloses a majority of the features of claim 14 as discussed in claims 4, 5 and 11 above, but neither Koto nor Kim explicitly discloses that the number N may vary from one frame of video to another frame of video, and the determination of the number N involves analysis of block differences in the previous frame. However, the Examiner takes Official Notice that one of ordinary skill in the art at the time of the invention would have found it obvious that a scene change may truncate a GOP, as is well known for instance to implement frame dropping rate control, therefore causing the GOP to contain less reference frames than is typical.

Re **claim 15**, the combined system of Koto and Kim discloses a majority of the features of claim 15, as discussed above in claim 4. Additionally, Koto discloses that for each rectangular block, the set of M reference blocks is divided into N sub-sets, such that each of the M reference blocks belongs to precisely one of the N sub-sets, and wherein the process of determining the optimal horizontal offset X and vertical offset Y is repeated for each of said N sub-sets of reference blocks, for indicating a set of N optimal horizontal offsets X and N vertical offsets Y (Koto: Fig. 11, MPEG may use a

linear prediction scheme, allowing a group of pictures (GOP) may be divided into subgroups, and, in turn, dividing the number of reference blocks as well).

Re **claim 16**, the combined system of Koto and Kim discloses a majority of the features of claim 16, as discussed above in claim 15. Additionally, Koto discloses that the number N of sub-sets may vary from one block to another within the given frame of video, said variation either based upon explicit signaling in the encoded bit stream or upon a deterministic algorithm (Koto: Fig. 11, the number of reference frames (explicitly indicated by the Code_number) may vary as well as the number and type of frames in a GOP, allowing the number of subsets to vary accordingly).

Re **claim 17**, the combined system of Koto and Kim discloses a majority of the features of claim 17 as discussed in claims 4 and 15-16 above, but neither Koto nor Kim explicitly discloses that the size of a rectangular block in one of the N sub-sets is computed at least partially using the size of a rectangular block in another of the N sub-sets or the values of the horizontal offsets X and vertical offsets Y. However, the Examiner takes Official Notice that one of ordinary skill in the art at the time of the invention would have found it obvious that a search block in a reference frame typically occupies an area that is a multiple of the size of the target block, as is well known.

Claim 20 has been analyzed and rejected with respect to claim 3 above.

Re **claim 21**, Koto discloses an apparatus, comprising: a motion estimation module, responsive to an input signal indicative of an original frame in a video sequence, for providing a set of predictions so as to allow a prediction module to form a

predicted image, wherein the video sequence including a plurality of video frames, each

frame containing a plurality of coefficients at different locations of the frame (Koto: Fig.

1, element 119); and a combining module, responsive to the input signal and the

predicted image, for providing residuals for encoding (Koto: Fig. 1, element 119),

wherein the motion estimation block is configured for selecting M reference frames for a

given original video frame in said plurality of video frames, wherein M is a positive

integer equal to or greater than 1 (Koto: Fig. 11); partitioning said original video frame

into rectangular blocks of coefficients (Koto: Abstract section); and from each of the M

reference frames: forming at least one reference block of coefficients from an offset of

the rectangular blocks (Koto: Fig. 12, the frames are partitioned into blocks and motion

vectors indicate offsets); and obtaining a block difference at least partially based on a

summation of differences between individual coefficients in each of said rectangular

blocks of coefficients and corresponding individual coefficients in said at least one

reference block of coefficients (Koto: Fig. 33);and optimizing the offset at least partially

based on the block difference (Koto: paragraph [0146]). Koto does not specifically

disclose using the absolute values of the differences between corresponding individual

coefficients in each of said rectangular blocks of coefficients and said at least one

reference block of coefficients. However, Kim discloses a method and apparatus for

video bit-rate control, wherein motion vectors are computed by a sum-of-absolute-

difference (SAD) based block matching scheme (Kim: paragraph [0017]) and the SAD

calculation compares current and reconstructed previous luminance samples on a pixel-

by-pixel basis (Kim: Equation [2]; paragraphs [0018]-[0022]). Since both Koto and Kim

relate to the coding of video sequences with predictive motion information, one of

ordinary skill in the art at the time of the invention would have found it obvious to

combine the SAD calculation of Kim with the coding scheme of Koto in order to provide

a system capable of adaptive quantization, thus allowing the system to operate at a

reduced computational complexity while still maintaining a target bit budget (Kim:

paragraph [0024]). The combined system of Koto and Kim has all of the features of

claim 21.

Claim 22 has been analyzed and rejected with respect to claim 5 above.

Claim 23 recites the corresponding computer program for implementing the

method of claim 4, and, therefore, has been analyzed and rejected with respect to claim

4 above.

Claim 25 has been analyzed and rejected with respect to claim 3 above.

Claim 27 has been analyzed and rejected with respect to claim 5 above.

Claim 28 has been analyzed and rejected with respect to claim 7 above.

Claim 29 has been analyzed and rejected with respect to claim 10 above.

Claim 30 has been analyzed and rejected with respect to claim 15 above.

Re **claim 31**, the combined system of Koto and Kim discloses a majority of the

features of claim 31, as discussed above in claim 6. Additionally, Koto discloses that M

is greater than 1 and the block differences for the M reference blocks are combined for

providing a weighted sum having a plurality of weighting factors, and wherein each

weighting factor in the weighted sum is determined at least partially based upon residual

energy of a previous video frame (Koto: Fig. 11, Code_number 0 indicates multi-

reference prediction).

4.   **Claim 8 is rejected under 35 U.S.C. 103(a) as being unpatentable over Koto**

et al. (US 20030215014) in view of Kim et al. (US 20030123539 A1), as applied to

claims 3-7, 9-17, 20-23, 25, and 27-30, and further in view of Wu et al. (US 6700933

B1).

Re **claim 8**, the combined system of Koto and Kim discloses a majority of the

features of claim 8 as discussed in claim 4 above, but neither Koto nor Kim explicitly

discloses that each of the M video frames selected as the M reference frames is

computed by decoding the same frame of original video at a variety of quality settings.

However, Wu discloses a method with advance predicted bit-plane coding for

progressive fine-granularity scalable (PFGS) video coding, where different layers are

used for different quality of video (Wu: Fig. 23). Since Koto, Kim, and Wu all employ

motion estimation/compensation (Koto: Abstract section; Wu: Fig. 19, elements 204,

206, and 207), one of ordinary skill in the art at the time of the invention would have

found it obvious to combine the bit-plane coding of Wu with the combined system of

Koto and Kim in order to provide a robust coding scheme which adapts to bandwidth

fluctuation and also exhibits good error recovery characteristics (Wu: column 3, lines

27-29). The combined system of Koto, Kim, and Wu has all of the features of claim 8.

Conclusion

5.   The prior art made of record and not relied upon is considered pertinent to

applicant's disclosure:

    a.   Multiple frame motion estimation

Lavagetto et al. (US 5151784 A)

    b.   Multi-hypothesis motion-compensated video image predictor

Wiegand et al. (US 6807231 B1)

    c.   Method and apparatus for weighted prediction estimation using a

displaced frame differential

Yin et al. (US 20060198440 A1)

Contact

Any inquiry concerning this communication or earlier communications from the

examiner should be directed to CHRISTOPHER FINDLEY whose telephone number is

(571)270-1199. The examiner can normally be reached on Monday through Friday,

8:30AM-5:00PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's

supervisor, Marsha D. Banks-Harold can be reached on 571-272-7905. The fax phone

number for the organization where this application or proceeding is assigned is 571-

273-8300.

Information regarding the status of an application may be obtained from the

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